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## Study the effect of varieties and planting date on sunflower production (*Helianthus annuus* L.)

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### ABSTRACT

This experiment was conducted to evaluate the Effect of Planting Date on Sunflower Production (*helianthus annuus* L.) To perform this experiment, the statistical design of factorial in the form of completely randomized blocks, with 4 replications was used. The grade factor was studied in 3 levels (Record = V1, Zaria =V2, Golshid =V3) and planting date factor was studied in four levels (July 15 =D1, July 30 =D2, August 14 = D3 , August 29 =D4 ). The obtained results showed that the effect of grade and planting date on diameter of circular flower of *Helianthus annuus* , thousand seed weight and seed yield was meaning full . but the mutual effect of planting date and grade on above mentioned cases was not meaningful. The highest yield of seed and oil was 3523 and 1713 Kg/h , respectively which was related to Golshid grade and was obtained on August 14 After that on planting date of August 29 , The grade of Golshid with production of 3313 kilograms seeds had the most production . The lowest level of seed yield was obtained on planting date of July 15 by grade of zaria which was 1900 kg seeds per hectare and after that the lowest yield of seed was obtained by record grade and on planting date of July 15 which was 2030 kg seeds per hectare. Increasing yield in planting date of August 14 is probably related to suitable climate conditions at the time of flowering and pollination and larger number of pollinating bees and insects.

**Key words:** yield, sunflower, Bam

### INTRODUCTION

Planting of oil seeds such as sunflower has allocated an important part of agriculture of world countries to itself. Applying oil seeds in human food consumptions and using their wastes to feed animals and also using them in pharmacy, soap industry and fuel has caused the farmers to be interested in it. And because the products resulted from oil plants prevent importing similar productions to countries and them importing oils and fuels are replaced by the governments often support their culturing. Iran is among the countries where planting oil plants such as sun flower have a long history. But based on many reasons we couldn't gain a good place in production of such products, so that more than 80 % of our need to oil seeds is met by imports. [1,5]

*Helianthus annuus* L. is from succor class and is originated in south western America and Mexico .Sunflowers are planted ornamentally and commercially. And each of them has many Varieties. some of it 's grades are planted to provide fresh forage. [7,9]

Sunflower is an annual plant with erect stem and surface roots , although the depth of main root into the soil can be up to 2/5 m . In apex of sunflower stem, its flower is appeared.

In modified grades, only one flower is appeared at the time of flowering but in other grades, many side flowers are formed on stem. [2,4]

Producing one main flower per shrub makes harvesting of sunflower easy in addition to growing and greening main flower and better feeding of seeds .[11]

In a research that was performed to study the effect of planting date (July 5 , July 20 , August 5) on seed yield of four sunflower grades (Record, Zaria, chrinanka, HybridMehr ) in Jiroft region , fariabi (1992) claimed that Record grade with yield of 385 , kg /h and on planting date of July 20 , zaria grade with yield of 3405 kg/h and on planting date of July 20 , zaria and Record grades from July20 to August 5 are recommend to plant in Jiroft region .[8]

In a research that was performed to study the effect of planting date of sunflower on repelling migrating passerines in Dezfulegion ,khodabandeh (1994) used the grades of zaria , chernianka and Hybrid Mehr and based on obtained results , he claimed that grades of zaria and hybrid Mehr on planting dates of August 22 to September 10 had the highest yield .[12]

In a research that was done to study the effect of planting date (April 10, April 25, May10) and shrub density (20, 40, 60, 80 thousands shrubs per hectar) on yield of oil sunflower in Mashhad region . Ghaderi and Rahimian (1994) reported that the highest seed yield was obtained in earlier dates and high densities[9].

In a study that was done in Golestanregion ,Nourish (1995) studied the most suitable planting date of sunflower good grades . The levels of factor of planting date included: April 30, May15, May30, and the levels of grade factor included :Record , zaria , group 1 and group 5 of Armavirsky . The obtained results showed that grade of group 1 of Armavirsky on planting date of April 30 with seed and oil yield of 2909 and 1321 kg/h are the most suitable grade and planting date.

The grades of group 5 of Armavirsky , Record , and zaria with seed yield of 2532 , 2488 and 2469 kg/h , respectively are in the later stages .[13]

In a research design that was performed in Jiroft agricultural research station, Aeenetal (1996) studied the effect of density and different patterns of planting on procedure of growth and yield of sunflower Values. The studied Values included: Record, Golshid and High sun. The obtained results showed that the effect of Value , density , planting pattern and also the mutual effect of Value and shrub density on seed yield and oil yield (3432 and 1378 kg/h , respectively) is related to Golshid Value .[1]

In a research that was performed to study the effect of planting date (May 7 , May 22 , June 6 , June 12 , July 8) on yield and yield components of sunflower values (Venimik 8931 , Record , Armavirsky) in region of Najaf Abad – E- Isfahan , seiedi (1996) claimed that the highest level of seed and oil yield is obtained from Value of Venimik 8931 on planting date of May 7 , and Values of Record and Armavirsky were in later stages .[3]

In a research that was performed in khuzestan to study the effect of planting date (from first day of August until August 15 ) on cultural traits , seed yield and it's components in values of sunflower (chernianka , Record , zaria ) , Naderi (1998) declared that the highest seed yield with levels of 2557 and 2409 kg/h was obtained from planting Record value on August 15 of first and second research year , whereas the highest seed yield in third year is related to zaria value on planting date of August 15 , and the traits of seed yield and seed number in the flower had meaningful relationship to flower diameter . Planting 2 values of Record and zaria in khuzestan is recommended at the first and middle times of August , because harvesting season and autumn rainfall aren't at the same time .[10]

In a research that was performed to determine the most suitable planting date of sunflower Values in rain-fed conditions of kalaleh region , Arshi etal (1999) use the Values of Record , Armavirsky , zaria and Hybrid Azargol and four planting dates (from March 15 with 15 day intervals) . The obtained the results showed that date planting is meaningfully related to seed yield, oil yield per hectare, flower diameter , percent of hollow seeds , thousand seed weight and leaf number per plant . The highest yield of oil seed (4010 kg /h) was obtained from planting Armavirsky value on the first planting date The yield of the same value on fourth planting date was decreased to 1342 kg/ h . [5]

In a research that was performed to evaluate ten new hybrids with controls (Golshid and Armavirsky Values) , Tee (2001) declared that among studied hybrids R-46 \* CMS 52 with value of Armavirsky and Golshid hybrid , had the highest seed yield of 4120 , 4116 and 4086 kg/h , respectively .

In a research that was performed to study and compare yield of new hybrids of sunflower in Mazandaran , Andarkhor (2002) declared

That a mong traits during vegetation period , the height and seed yield had meaningful difference and in grouping , value of Record with 135 day period riped later than others Also the most height was allocated to value of Record the largest diameter of flower (15/80 cm ) and highest yield of 2119 kg/h

Was related to hybrid 2. [2]

In a research that was performed to evaluate yield and cultural propertles of 100 single cross hybrids of sunflower ,Ghafari and Tae (2002 )

Used values of Record and Golshid as control . the obtained results indicated that number of 28 new hybrids with the yield higher than 3/382 T/h is better than Golshid hybrid with yield of 2/416 T/h and The highest yield was related to two hybrids of SPK 43/58 and SPK 98/43 .[7]

In a research that was performed in region of Dashtab ,Baft , Najafi (1997 ) studied the effects of value on yield of oil sunflower . In this research , he used value of Record , Luch ,Venimak 8931 , Armavirsky , zaria , chernianka , perdovik , Azargol Hybrid and Golshid during years of 1994 – 1996 . The .results obtained from this experiment showed that values of Record and chernianka with seed yield of 2750 and 2730 kg/h are better than other values . The values of Record and zaria with yield of 1200 kg / h had the highest oil yield.

Azargol Hybrid on 1996 had the highest yield of seed and oil .[12,6]

## MATERIALS AND METHODS

This research was performed on cultural year of 2003 in farm of agricultural research station of Aziz Abad located in 50 km of Bam township with geographical location of east 57' , 24" and north 29' , 6" . It's height from sea level was 1100 m and its area was 1100 m<sup>2</sup> . The minimum temperature is usually an January ( about - 2°c ) and its maximum is july and August that reaches 48 ° c . In this region , day length on early July is about 14 h and on early January is about 10 h . The annual average precipitation is 65 mm.

This research was performed by using the factorial design in the form of completely randomized blocks, with 4 replications. the factor of planting date was studied in four levels ( july 15 , A July 30 , August 15 , August 29 ) and factor of value was studied in three levels (Record , zaria , Golshid ) . Each replication contained 12 plots each of which contained five 5/5 meter rows of sunflower and rows were 60 cm distant from eachother and there was a 25 cm space among the shrubs of each row , The area of each plot was 16/5 m<sup>2</sup> and interval of replications from eachother was two meters . Before performing experiment , the farm soil was sampled to determine the soil texture and chemical properties . To do such a work several samples were taken from 0 to 30 cm and 30 to 60 cm depth of form soil . After combining related samples to eachother , two compound samples were sent to agrology laboratory to determine soil texture and level of chemical compounds available in soil .

The earth related to this experiment hasn't been cultured since 1996 .on first day of July , 2003 , the operations such as ploughing and disk were done to make the earth prepared . After earth tabulation , the sikes and plots were prepared by workers .

Then the treatments of planting date and value which were randomly prepared according to experiment map were applied.

Also the necessary fertilizers were added ti soil before planting and nitrogenated fertilizer was used as additive.

Planting and maintenance operations:

After preparing earth, planting seeds was performed after marking by ropes. At each planting date , 3 plots of each block were planted . The created grooves were 2 to 3 cm in depth and inside each groove , three seeds were poured that were weltered by Benumil fungicide . Then they were covered by fine soil and .the irrigation was immediately done.

The latter .irrigation was done after 3 days. And it's level was adjusted once per week.

After planting, the plots were covered by white cloth nets to protect them from attacking by birds.

Farm sparse Operation was done manually during 2 or 4 leaf stage. In This stage, the cloth nets were removed. The mechanical fight against weeds was also done in two steps. Any special disease wasn't observed at the farm, and

green plastic nets were used to avoid birds attack to ripe flowers . They were very useful to decrease the losses by birds.

During performing experiment, urea fertilizer was used in 3 stages.

Harvesting brown and ripe flowers of sunflower was started from first days of October and was continued until last days of December .the final harvesting was done from a 9 m<sup>2</sup> surfaces in each plot. Then the ripe flowers were trashed by workers and information about diameter of flower, thousand seed weight and seed yield were noted.

**RESULTS AND DISCUSSION**

**The measured traits:**

**Flower diameter:**

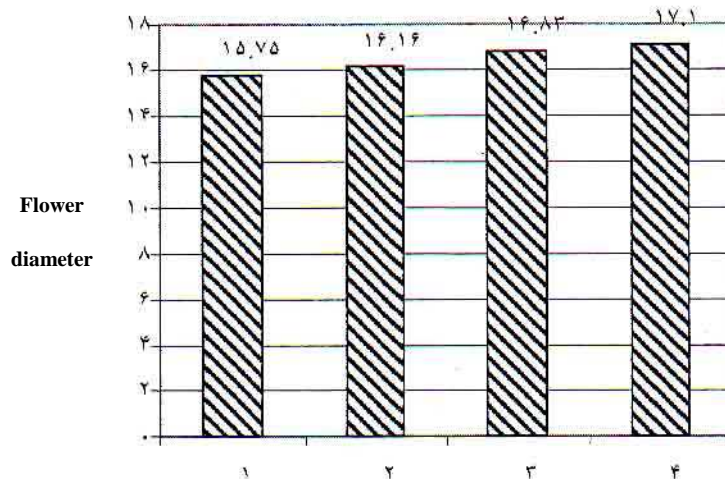
Comparing mean of value levels (table 3-2 ) indicated that Record value with 17/65 cm flower diameter has a larger diameter than Golshid and zaria value .

The value of Golshid with 15/49 cm flower diameter was smaller than other values .

The effect of planting date on flower diameter was significant at 1% level .Comparing mean of different levels of planting date (table 3-2 ) showed that the largest size of flower diameter is related to planting date of August 29 and its smallest size is related to date of July 15 . Diagram 2 shows the flower diameter in different levels of planting date.

**Table3-2: comparison of mean of simple effects of sunflower values (v), planting date.(d)and mutual effects on flower diameter(cm) by the method of Duncan in level of 1%.**

Value Planting date	V1	V2	V3	mean
D1	16/92 C	15/75 F	14/75 H	15/75 D
D2	17/37 B	15/92 E	15/17 G	16/16 C
D3	18/05 A	16/57 D	15/88 EF	16/83 B
D4	18/25 A	16/87 CD	16/17E	17/10 A
mean	17/65 A	16/24 B	15/49 C	



**Diagram 3-2:comarision of mean of simple effects in planting date**

**Seed weight :**

Comparing mean of value levels (table 3-4) showed that there is a meaningful difference among thousand seed weight of studied values. Golshid value that it’s mean of thous and seed weight was 60/76 grams had the highest thousand seed weight and Record value with 54/38 grams had the lowest thousand seed weight.

The effect of planting date on thousand seed weight was meaningful in the level of 1%.thecomparisons showed that the effects of planting date on thousand seed weight is varied . the highest weight of thousand seed was obtained on August 14 (58/58 g)

Bu comparing value and planning date mean (table 3-4) shows that the value of Golshid with thousand seed weigh of 62/35g on August 14 has the highest thousand seed weight and Record value with 53/67 g on August 2, has thelowest one .

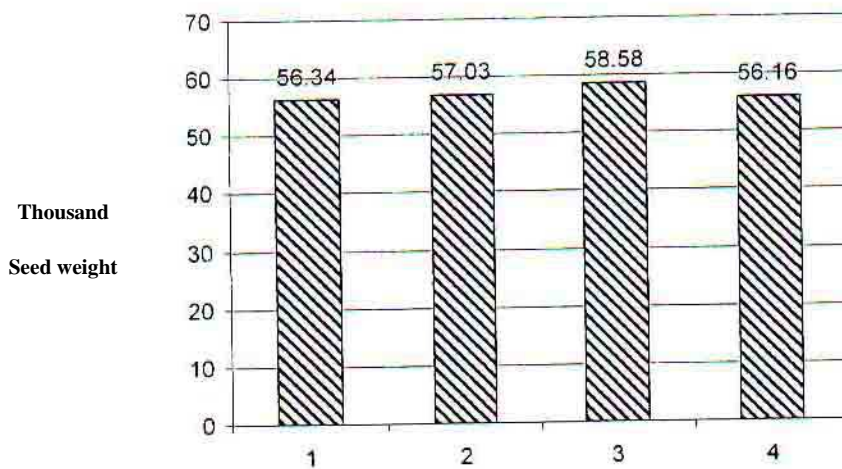


Diagram3-5:comparison of mean of simple effects of planting date on thousand seed weight

**Seed yield**

Variance analysis of seed yield is shown in table 3-7 the effect of values on seed yield has become meaning ful in the level of 1%. Comparison of mean of seed yield in table 3- indicates that Golshid value with production of 3089 kg seeds per hectare is better than two treatments of Record and Zaria .

The effect of planting date on seed yield was significant in the level of 1% (table 3-7) .The comparison of means in table 3-8 shows that planting date of July 14 with seed yield of 3287 kg/h has the highest yield and the lowest yield was obtained on planting date of July 15 with yield of 2160 kg . The effect of planting dates on seed yield is shown in diagram 11.

The mutual effect of value and planting date on seed yield became meaningful. (table 3-8) the comparison of mean of mutual effect of value and planting date ( table 3-8 ) showed that Golshid value on planning date of August 14 with seed yield of 3523 kg/h is better than other mutual effects of planting date and value . Also, zaria value on planting date of july15 with seed yield of 1800kg/h has the minimum yield.

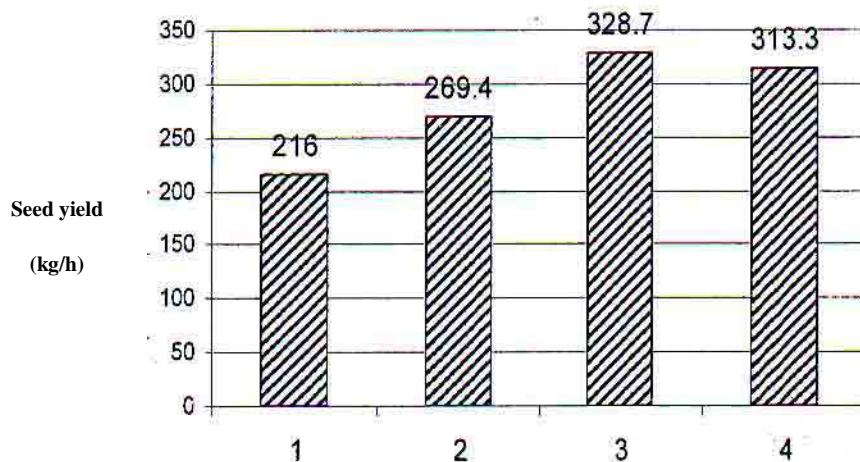


Diagram3-11: comparison of mean of simple planting date on seed yield

Table3-7: variance analysis of seed yield

Variation sources	df	SS	MS	F
Replication	3	5059/50	1686/50	6/69**
Factor A	2	20035/16	10017/58	39/76**
Factor B	3	90550/83	30183/61	119/81**
AB	6	1499/66	249/94	0/99 n.s
Experiment error	33	8313/50	251/92	
total	47			

Table 3-8: comparison of mean of simple effects of value (v), planting date (D) and their mutual effects on seed yield(kg/Ha)

Value Planting date	V1	V2	V3	mean
D1	203/0 E	190/0 E	255/0 D	216/00 D
D2	263/8 D	247/5 D	297/0 C	269/400 C
D3	328/8 AB	305/0 C	352/03 A	328/70 A
D4	305/0 BC	297/5 C	331/3 A	311/30 B
mean	275/10 B	260/00 C	308/90 A	

The following discussions can be mentioned from obtained results:

The size of flower is affected by value and planting date so that its highest size is observed in Record value (17/65 cm) and its lowest size is observed in Golshid value (15/49 cm) but thousand seed weight of Golshid was higher that with higher efficiency in transporting photosynthesis materials could produce the higher seed yield. The effect of planting date on diameter of flower was well documented so that the largest diameter was obtained on August 29 and its smallest on planting date of July 15. this case is specially related to increasing moisture and temperature tensions and blowing hot winds at the time of flowering of sunflowers planted in middle July.

In this research, thousand seed weight was affected so that it's highest was related to Golshid (60/76 g) and it's lowest was related to Record value (54/38). It's because of Golshid's higher ability to transport photosynthesis matters into seeds. Also, the effect of planting date on thousand seed weight was meaningful, so that it's highest level was obtained on planting date of August 14. this is also related to suitable environment conditions at the time of flowering and seed filling. In this time the region temperature was lower and shortage of water resources was removed and blowing hot winds that lowered the level of lands (plant photosynthesis factor) is decreased.

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